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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 09/977,038

Filing Date: October 12, 2001

Appellant(s): BROWN ET AL.

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Dan C. Hu  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed June 30, 2006, appealing from the Office action mailed February 21, 2006.

**(1) *Real Party in Interest***

A statement identifying the real party in interest is contained in the brief.

**(2) *Related Appeals and Interferences***

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

The statement of the status of the claims contained in the brief is correct.

**(3) *Status of Claims***

The statement of the status of the claims contained in the brief is correct.

**(4) *Status of Amendments After Final***

Amendment (filed 01/31/2006) after final has been filed.

**(5) *Summary of Invention***

The summary of invention contained in the brief is correct.

**(6) *Grounds of rejection to be reviewed on appeal***

The appellant's statement of the issues in the brief is correct.

1. The rejection of claims 1 and 7 under 35 U.S.C. § 101, as being directed to non-statutory subject matter (Amendment after final, filed on January 31, 2006, has

been entered, and overcome the rejection of claims 15-26 and 33 under 35 U.S.C. § 101. Thus, the rejection of claims 1 and 7 under 35 U.S.C. § 101, is withdrawn and will not be reviewed on appeal);

2. The rejection of claims 1-21, 40 and 43-46 under 35 U.S.C. § 103, as being anticipated by Agrawal et al (U.S. Patent No. 6,366,903, hereinafter, "Agrawal").

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) *ClaimsAppealed***

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(9) *Prior Art of Record***

U.S. Patent No. 6,366,903      Agrawal et al      04-2002

**(10) *Grounds of Rejection***

The following ground(s) of rejection are applicable to the appealed claims:

1. The rejection of claims 1-21, 40 and 43-46 under 35 U.S.C. 102(e) as being anticipated by Agrawal et al (U.S. Patent No. 6,366,903, hereinafter, "Agrawal").

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1-21, 40 and 43-46 are rejected under 35 U.S.C. 102(e) as being anticipated by Agrawal et al (U.S. Patent No. 6,366,903, hereinafter, "Agrawal").

With respect to claim 1, Agrawal discloses, emulation module (240, optimizing, fig. 2, col. 7, lines 47-67 to col. 8, lines 1-31) to receive environment information of a database system, the emulation module to emulate an environment of the database

system based on the environment information, see (col. 2, lines 49-62, database comprises information, and optimizers is database components that generate optimizing plan for each query, 240, optimizing, fig. 2, col. 7, lines 47-67 to col. 8, lines 1-31); first module executable in the emulated environment (optimizing, fig. 2, col. 7, lines 47-67 to col. 8, lines 1-31) and adapted to receive a set of queries (workload, col. 2, lines 38-49, col. 6, lines 57-67 to col. 7, lines 1-20) and to provide a set of candidate indexes for the set of queries (230, select candidate indexes for workload, fig. 2, col. 7, lines 21-47), the first module adapted to eliminate (col. 10, lines 31-67 to col. 11, lines 1-3) one or more candidate indexes based on one or more predetermined criteria (240, 250, fig. 2, col. 7, lines 47-67 to col. 8, lines 1-61, candidate indexes are reviewed); and second module executable in the emulated environment and adapted to generate a recommended index from the set of candidate indexes, see (260, final recommended indexes are generated, fig. 2, col. 4, lines 42-52, col. 15, lines 36-59).

With respect to claim 2, Agrawal discloses, set of queries comprises a set of SQL statements, see (col. 7, lines 18-21).

With respect to claims 3, Agrawal discloses, generate at least another recommended index from the set of candidate indexes, see (260, final recommended indexes are generated, fig. 2, col. 4, lines 42-52, col. 15, lines 36-59).

With respect to claims 4, Agrawal discloses, optimizer tat is adapted to user statistics, see (240, fig. 2, col. 14, lines 40-54).

With respect to claim 5, Agrawal discloses, statistics are based on a scan of a sample of one or more tables, the sample less than all the rows of the one or more tables, see (col. 1, lines 56-65, fig. 2, col. 14, lines 40-54).

With respect to claim 6, Agrawal discloses, user interface to receive an indication of a user-specified size of the sample, see (fig. 2, col. 14, lines 40-54).

With respect to claim 7, Agrawal discloses, first module adapted to receive a set of queries (workload, col. 2, lines 38-49, col. 6, lines 57-67 to col. 7, lines 1-20) and to provide a set of candidate indexes for the set of queries (230, select candidate indexes for workload, fig. 2, col. 7, lines 21-47), first module adapted to eliminate one or more candidate indexes based on one or more predetermined criteria, (240, 250, fig. 2, col. 7, lines 47-67 to col. 8, lines 1-61, candidate indexes are reviewed); optimizer adapted to generate a recommended index from the set of candidate indexes (260, final recommended indexes are generated, fig. 2, col. 4, lines 42-52, col. 15, lines 36-59), wherein the one or more predetermined criteria comprises a threshold change rate (col. 10, lines 34-67, col. 15, lines 15-58), first module adapted to eliminate one or more candidate indexes having a change rate exceeding the threshold change rate (col. 10, lines 34-67, col. 15, lines 15-58).

With respect to claim 8, Agrawal discloses, eliminate a candidate index that is a subset of another candidate index, see (col. 10, lines 34-67, col. 15, lines 15-58).

With respect to claim 9, Agrawal discloses, analysis module adapted to cooperate with the optimizer to generate the recommended index, see (col. 4, lines 6-10, 260, final recommended indexes are generated, fig. 2, col. 4, lines 42-52, col. 15, lines 36-59).

With respect to claim 10, Agrawal discloses, set of candidate indexes by identifying the candidate indexes from the set of queries and defining the set of queries in a database, see (workload, col. 2, lines 38-49, col. 6, lines 57-67 to col. 7, lines 1-20).

With respect to claims 11-12, Agrawal discloses, access the database to retrieve and validate the candidate indexes, see (col. 10, lines 34-67, col. 15, lines 15-58).

With respect to claim 13, Agrawal discloses, user interface to receive user-specified one or more indexes, the optimizer adapted to generate a cost associated with a query plan based on the user-specified one or more indexes, see (col. 10, lines 34-67, col. 15, lines 15-58).

With respect to claim 14, Agrawal discloses, collect statistics based on a sample of rows of one or more tables, a size of the sample based on the user-specified percentage value, see (col. 14, lines 16-54).

With respect to claims 15-16, Agrawal discloses, hint based on a sample of rows of one or more tables, a size of the sample based on the user-specified percentage value, see (col. 14, lines 16-54).

With respect to claim 17, Agrawal discloses, analysis module adapted to apply a predetermined algorithm, the analysis module adapted to cooperate with the optimizer to generate the recommended index using the predetermined algorithm, see (col. 14, lines 16-54).

With respect to claim 18, Agrawal discloses, analysis module is adapted to submit candidate indexes to the optimizer, the optimizer adapted to determine the cost of one or more of the queries based on the candidate indexes, see (col. 7, lines 48-67 to col. 8, lines 1-30).

With respect to claim 19, Agrawal discloses, optimizer is adapted to select the candidate index associated with a lowest cost as the recommended index, see (col. 7, lines 48-67 to col. 8, lines 1-30).

With respect to claim 20, Agrawal discloses, workload captured from the database system, and wherein the database system is a parallel system having plural access modules, the environment information containing information regarding the parallel system and plural access modules, see (col. 2, lines 38-49, col. 6, lines 57-67 to col. 7, lines 1-20).

With respect to claim 21, Agrawal discloses, optimizer is adapted to compute costs for the candidate indexes in the emulated environment of the database system, see (col. 8, lines 10-30).

With respect to claim 40, Agrawal discloses, receive a set of queries, see (workload, col. 2, lines 38-49, col. 6, lines 57-67 to col. 7, lines 1-20); generate a set of candidate indexes from the set of queries, see (230, select candidate indexes for workload, fig. 2, col. 7, lines 21-47); eliminate candidate indexes based on one or more predetermined criteria, see, (240, 250, fig. 2, col. 7, lines 47-67 to col. 8, lines 1-61, candidate indexes are reviewed); invoke an optimizer to perform cost analysis of the candidate indexes, see (col. 8, lines 10-30); and use the cost analysis to select a recommended index for a database system, (col. 8, lines 10-30); wherein eliminating candidate indexes based on one or more predetermined criteria comprises at least one of: eliminating candidate indexes that are changed with updates at a rate greater than a predetermined change rate threshold, see (col. 10, lines 34-67, col. 15, lines 15-58);

and eliminating a candidate index that is a subset of another candidate index, see (col. 10, lines 34-67, col. 15, lines 15-58).

With respect to claim 43, Agrawal discloses, genetic algorithm to select the recommended index, see (col. 8, lines 10-30).

With respect to claim 44, Agrawal discloses, import environment information regarding the database system; emulate an environment of the database system based on the imported environment information, wherein the generating, eliminating, invoking, and using acts are performed in the emulated environment, see (col. 10, lines 34-67, col. 15, lines 15-58).

With respect to claims 45-46, Agrawal discloses, cost-related information, statistics, and random samples from the database system, see (fig. 2, col. 7, lines 47-67 to col. 8, lines 1-61).

**(11) Response to Argument**

Applicant argued that Agrawal does not teach:

- 1) "emulation module to receive environment information of a **database system separate from the test system**";
- 2) "based on a scan of a sample of one or more tables, where the sample is less than all the rows of the one or more tables";
- 3) "analysis module adapted to apply a genetic algorithm and to cooperate with the optimizer to generate the recommended index using the genetic algorithm";
- 4) "cost-related information, statistics and random samples from the database system";

The argument is **not** persuasive.

Regarding arguing 1), examiner has objected the limitation, "environment information of a database system separate from the test system" as being indefinite for failing to point out and distinctly claim the subject matter which applicant regards as invention in final rejection mailed 12/01/2005. But applicant argument in appeal brief does not explain why the claimed limitation is definite. The test system of claimed invention comprises modules that are computer programs executed by computer processor. The computer program modules cannot be distinguished by physical hardware component (such as, database system or test system) but only can be

distinguished by computer program function. The claimed limitation “a database system separate from the test system”, does not provide that “separate” is by physical hardware component or by computer program function. Therefore, the claimed limitation, “environment information of a database system separate from the test system” is indefinite. The “**database system**” is computer programs that function information management and the “**test system**” is also computer programs that function testing information received from the database system. Therefore, examiner’s interpretation of **separate** is by computer program functions. Agrawal teaches the test system (i.e., 210 in fig. 2) receives the environment information (i.e., workload, set of queries, 215 in fig. 2, col. 6, lines 55-67 to col. 7-8) from the database system that generates set of queries, separate from the test system by computer program functions. Thus, Agrawal teaches “emulation module to receive environment information of a **database system separate from the test system**” as claimed.

Regarding to arguing 2), Agrawal discloses, “building index is a subset of a table, which typically contains fewer columns than the table itself” (col. 1, lines 57-65). This teaches that creating recommended index requires scan whole database table and recommended index table has less rows than original table’s rows as claimed.

Regarding to arguing 3), Agrawal discloses, “Enumeration of the set of candidate indexes and candidate materialized views is then performed using a greedy algorithm as has been previously used with only with candidate indexes. That same algorithm can be used to enumerate both indexes and materialized views” (col. 4, lines 6-10). This

teaches that computer program module uses algorithm to generate the recommended index as claimed.

Regarding to arguing 4), Agrawal discloses, "Module 240 provides cost information regarding candidates relative to the workload and the server" (col. 7, lines 47-63), and "One way to estimate the size of a materialized view is to obtain an estimate of the number of rows in the materialized view definition from the query optimizer, and multiply this with the total width of all columns in the materialized view. The accuracy of such estimation depends on the availability of an appropriate set of statistics for query optimization" (col.14, lines 40-53). This teaches that cost-related information, statistics and random samples from the database system as claimed.

#### **(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Isaac Woo



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